



Engineering

Certification Document 3: Portfolio, Engineering Notebook & Equipment Guide

| Levels of Assessment | Interpretation of Level |
|-----------------------|---|
| 4 – Excellent | Exceeds requirements. |
| 3 – Good | Meets requirements. No need for additional technical assistance at this time, although some areas, as indicated, could be improved. |
| 2 – Needs Improvement | Generally fall below requirements. Demonstrates limited effectiveness; additional technical assistance and/or resource utilization is needed for improvement. |
| 1 – Poor or Missing | Evidences little or no effectiveness. A great deal of technical assistance and/or resource utilization would be an immediate need. |
| N/A – Not Applicable | Does not apply to the program being reviewed. |

I. Student Portfolios should contain evidence of:

| A. Introduction to Engineering Design™ (IED) | 1 | 2 | 3 | 4 | N/A |
|---|---|---|---|---|-----|
| Reverse engineering project computer generated drawings | | | | | |
| Digital picture of a design solution prototype | | | | | |
| Computer generated technical drawings (i.e.: isometrics, play equipment, train) | | | | | |
| B. Principles of Engineering™ (POE) | | | | | |
| Digital picture of the marble sorter and ballistic device | | | | | |
| Technical writing samples (i.e.: engineer interview) | | | | | |
| Printout of PowerPoint® sample (i.e.: college research) | | | | | |
| Materials testing technical report (sample & analysis with graphs) | | | | | |
| Career research project | | | | | |
| Fischertechnik programming (i.e.: marble sorter) | | | | | |
| C. Digital Electronics™ (DE) | | | | | |
| Pictures of bread boarded circuits (i.e.: birthday problem) | | | | | |
| Printouts of computer simulated circuits | | | | | |
| D. Aerospace Engineering™ (AE) | | | | | |
| Aerospace history technical report | | | | | |
| Digital picture of rocket model launch & altitude data table | | | | | |
| Positive Gforce experiment testing procedure | | | | | |
| Digital picture of microgravity drop tower & written experimental procedures | | | | | |
| E. Biotechnical Engineering™ (BE) | | | | | |
| Instrument calibration.xls | | | | | |
| Rapid pathogen identification final report | | | | | |
| CSI forensic technique final paper | | | | | |
| Digital picture of yeast mobile design & competition results | | | | | |
| Digital picture of aquaponics experiment | | | | | |

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|--|---|---|---|---|-----|
| Digital picture of joint model prototype design | | | | | |
| F. Civil Engineering and Architecture™ (CEA) | 1 | 2 | 3 | 4 | N/A |
| Computer generated drawings of a smaller project (i.e.: shed, cabin) | | | | | |
| Computer generated drawings of large design project | | | | | |
| G. Computer Integrated Manufacturing™ (CIM) | | | | | |
| Digital picture of final design (i.e.: soap mold, box & lid) | | | | | |
| Printout of CNC program for a milled project (i.e.: soap mold) | | | | | |
| Written program for coordinate geometry example (i.e.: initials) | | | | | |
| Printout of handshaking program (i.e.: palletizing routine) | | | | | |
| Printouts of Fischertechnik programming (i.e.: limit switches on track, FMS) | | | | | |
| H. Engineering Design and Development™ (EDD) | | | | | |
| Project management timeline with milestones and dates from initial idea conception to final presentation | | | | | |
| Final presentation PowerPoint® | | | | | |
| Computer generated technical drawings of design solution | | | | | |
| Prototype testing and analysis final results | | | | | |
| Digital picture of final design prototype | | | | | |

II. Engineering notebooks should contain evidence of:

| | | | | | |
|--|---|---|---|---|-----|
| A. Introduction to Engineering Design™ (IED) | 1 | 2 | 3 | 4 | N/A |
| Freehand sketches | | | | | |
| Sketches and notes to indicate that the design process was followed on a design project | | | | | |
| Group project showing brainstorming technique | | | | | |
| Project Management example showing responsibilities and timeline | | | | | |
| Prototype of design solution | | | | | |
| B. Principles of Engineering™ (POE) | | | | | |
| Design freehand sketches of marble sorter and ballistic device | | | | | |
| Notes for a technical writing samples (i.e.: engineer interview) | | | | | |
| Project Management example showing responsibilities and timeline (i.e.: ballistic device, marble sorter) | | | | | |
| Word problem solutions (i.e.: stress, strain, tension) | | | | | |
| Materials testing technical report outline and notes | | | | | |
| Career research project notes | | | | | |
| Fischertechnik programming sequence notes (i.e.: marble sorter) | | | | | |
| C. Digital Electronics™ (DE) | | | | | |
| Boolean algebra simplification & truth tables | | | | | |
| KMapping | | | | | |
| Number System Conversions (i.e.: binary to hex to...) | | | | | |
| Circuit Schematics | | | | | |

| D. Aerospace Engineering (AE) | 1 | 2 | 3 | 4 | N/A |
|--|---|---|---|---|-----|
| Lift & drag mathematical calculations | | | | | |
| Copy of airfoil data spreadsheet (Activity 2.1.1) | | | | | |
| Glider flight test data (Activity 3.1.6) | | | | | |
| GPS waypoint identification table (Activity 3.2.1) | | | | | |
| Microgravity drop tower experiment sketches & procedures | | | | | |
| Composite plastic samples test data sheets, Young's modulus calculations | | | | | |
| Thermal protection test data sheets | | | | | |
| E. Biotechnical Engineering™ (BE) | | | | | |
| Bioethics survey data | | | | | |
| Hand drawn sketches of DNS model | | | | | |
| Yeast mobile design sketches | | | | | |
| Aquaponics experiment data table | | | | | |
| Design sketches of joint model prototype designs | | | | | |
| F. Civil Engineering and Architecture™ (CEA) | | | | | |
| Design process sketches (i.e.: cabin, big project) | | | | | |
| Group work notes (big project) | | | | | |
| Project Management (i.e.: big project) | | | | | |
| Project calculations for: loads, building systems, runoff (i.e.: samples & big project calculations) | | | | | |
| Project research for: codes, restrictions | | | | | |
| Computer generated drawings of design projects | | | | | |
| G. Computer Integrated Manufacturing™ (CIM) | | | | | |
| Project management (i.e.: soap mold, sumo cars) | | | | | |
| Design sketches | | | | | |
| Computer simulation of milled project (i.e.: soap mold) | | | | | |
| Milled project (i.e.: soap mold, box & lid) | | | | | |
| Coordinate geometry examples (i.e.: initials) | | | | | |
| CNC programming sample | | | | | |
| Handshaking program (i.e.: palletizing routine) | | | | | |
| Fischertechnik programming (i.e.: limit switches on track) | | | | | |
| H. Engineering Design and Development™ (EDD) | | | | | |
| Progress from initial idea conception to prototype testing | | | | | |
| Outline of final PowerPoint® presentation | | | | | |
| Sketches and notes reflecting patent research, design solution, input from experts, prototype testing & analysis | | | | | |

III. Equipment

| Overall | 1 | 2 | 3 | 4 | N/A |
|---|----------|----------|----------|----------|------------|
| Appropriate software for the courses offered | | | | | |
| Digital Cameras | | | | | |
| Computers for each student enrolled | | | | | |
| Printer and/or plotter capability equipment | | | | | |
| A. Introduction to Engineering Design™ (IED) | | | | | |
| Dial calipers | | | | | |
| B. Principles of Engineering™ (POE) | | | | | |
| Fischertechnik equipment (adequate for enrollment) | | | | | |
| Trainers and/or Economatics | | | | | |
| Tensile/Stress Analyzer & materials samples | | | | | |
| Digimatic Mini-Processor & Caliper | | | | | |
| C. Digital Electronics™ (DE) | | | | | |
| Digital Logic Board | | | | | |
| Fischertechnik DE kits | | | | | |
| Breadboards, integrated circuit components, wires | | | | | |
| Multi testers, soldering irons | | | | | |
| Boe-Bot® Kits | | | | | |
| D. Aerospace Engineering™ (AE) | | | | | |
| Wind tunnel | | | | | |
| Foam cutters | | | | | |
| Garmin GPS units | | | | | |
| Engine thrust measurement device | | | | | |
| Positive Gforce experiment apparatus | | | | | |
| Fischertechnik equipment (adequate for enrollment) | | | | | |
| Propane torches & chemical goggles | | | | | |
| Boe-Bot® Kits | | | | | |
| E. Biotechnical Engineering™ (BE) | | | | | |
| Micro centrifuge | | | | | |
| Assorted science experiment glassware | | | | | |
| Microscope, triple beam balance | | | | | |
| Aquarium | | | | | |
| Plastic skulls | | | | | |
| Proscope HR basic kit | | | | | |

| F. Civil Engineering and Architecture™ | 1 | 2 | 3 | 4 | N/A |
|--|---|---|---|---|-----|
| Surveying equipment | | | | | |
| Soil testing sieves | | | | | |
| G. Computer Integrated Manufacturing™ (CIM) | | | | | |
| Robotic arm capable of handshaking with a mill | | | | | |
| CNC Mill | | | | | |
| Fischertechnik equipment (adequate for enrollment) | | | | | |
| Milling material (i.e.: wax, butter board, solid laminate) | | | | | |
| H. Engineering Design and Development™ (EDD) | | | | | |
| Final presentation room | | | | | |
| Testing equipment for prototype or off campus access | | | | | |